UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF COMMERCIAL FISHERIES

CALIFORNIA FISHERY MARKET NEWS MONTHLY SUMMARY

February 1964

Part II–Fishing Information*

Sea-surface temperatures, fishing and research information of interest to the West Coast tuna-fishing industry and marine scientists

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* Part I - "Fishery Products Production and Market Data" is issued by the Bureau of Commercial Fisheries, Market News Service, Post Office Building, San Pedro, California

THE U.S. NAVY PICKET VESSEL ALBACORE CATCH FOR 1963

INTRODUCTION

In continuation of the cooperative trolling program which was started in 1960, the U.S. Navy continued to log albacore catches in 1963 at each of its radar early warning surveillance stations off the west coast of the United States. As before, coverage extended from latitude 31°N. to 50°N. at a distance of 200-550 miles from shore. Stations were continuously manned by a fleet of several vessels participating in a rotation schedule placing each ship on a given station for 20-30 day intervals. For a brief description of equipment used and general fishing strategy, see Flittner (1961) and Johnson (1960).

Fishing commenced on April 1 and terminated November 1. When it became obvious from catch records that a late-season flurry of activity might take place at the southern stations, vessels were asked to continue fishing through the months of November and December.

RESULTS

The catch for 1963 was the highest for any one year since inception of the program. A total of 1,041 albacore was taken by the picket fleet. The estimated weight of this catch is about 10,858 pounds, or 5.4 tons.

The first catch of the 1963 season was reported at Station 3 on June 16 (table 1, figure 1). The appearance of albacore at this station was about two weeks earlier than in previous years. Fishing continued with few interruptions through the season, and the last catch was logged on October 4. Water temperatures ranged from 61-62°F. at the beginning to 68-69°F. at the termination of fishing. Albacore appeared at Station 4 on July 17, about 5 weeks later than last year, and were first taken at Station 5 on July 25, more than 6 weeks later than in 1962.[1/] Stations 1 and 2 recorded their first catches of the year on July 23. Water temperatures at these locations ranged from 55-58°F. at the commencement of fishing to 64-65°F. at the end of September.

1/ Comparisons are drawn with 1962 ship stations nearest to present stations, but 1962 locations having the same numbers may differ from current positions by as much as 150 miles.

Table 1.--Date of first albacore catch and water temperature at U. S. Navy radar picket stations, 1960-1963.

Station number and year	Approximate position Latitude	Longitude	Date of first catch	Water temperature (°F)
1				
1960	49°N.	129°W.	(none caught)	-
1961	47°N.	130°W.	August 13	60
1962	50°N.	134°W.	August 6	62
1963	50°N.	136°W.	July 23	55
2				
1960	45°N.	130°W.	July 15	60
1961	43°N.	130°W.	July 7	63
1962	45°N.	135°W.	August 7	63
1963	46°N.	135°W.	July 23	58
3				
1960	40°N.	129°W.	July 10	58
1961	40°N.	133°W.	June 29	59
1962	42°N.	129°W.	July 6	59
1963	41°N.	134°W.	June 16	62
4				
1960	36°N.	128°W.	June 14	65
1961	35°N.	132°W.	June 17	64
1962	40°N.	133°W.	June 17	59
1963	36°N.	132°W.	July 17	65
5				
1960	32°N.	124°W.	June 5	62
1961	32°N.	124°W.	June 8	64
1962	35°N.	132°W.	June 11	59
1963	31°N.	129°W.	July 25	64
6 [1/]				
1960	x [2/]	x	x	-
1961	x	x	x	-
1962	30°N.	128°W.	July 19	64
1963	36°N.	124°W.	July 23	64

[1/] Fishing intermittent during season.
[2/] Station not fished.

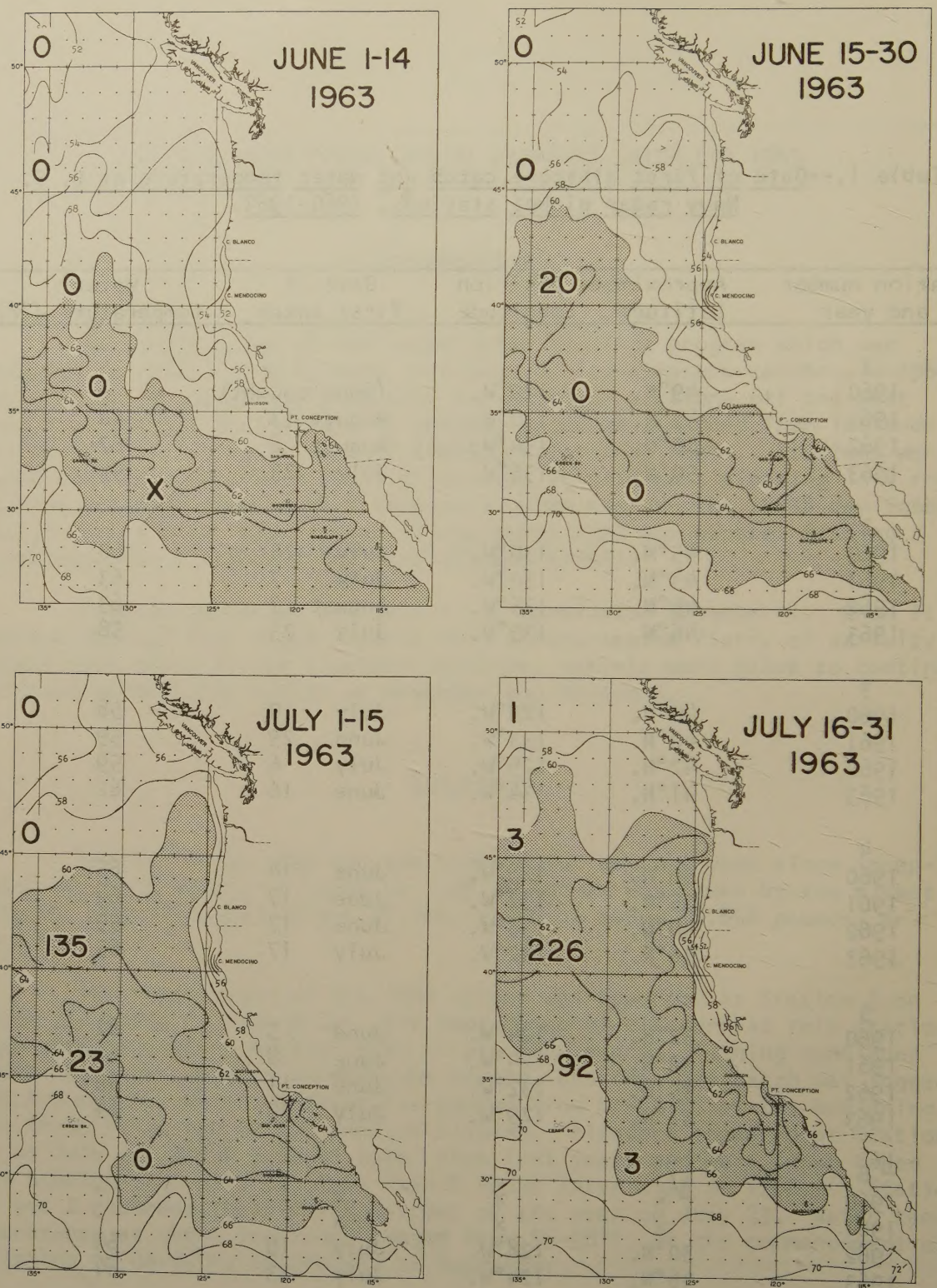

Figure 1.--Albacore catch by U.S. Navy radar picket vessels in June-July 1963. Large numerals represent the catch at each station; small numerals indicate water temperature; and "x" indicates no fishing during the period. Shaded area delimits the 60-66°F. temperature zone. More than two-thirds of the 1954-1958 California commercial albacore landings for June-September were taken from waters within these temperature limits.

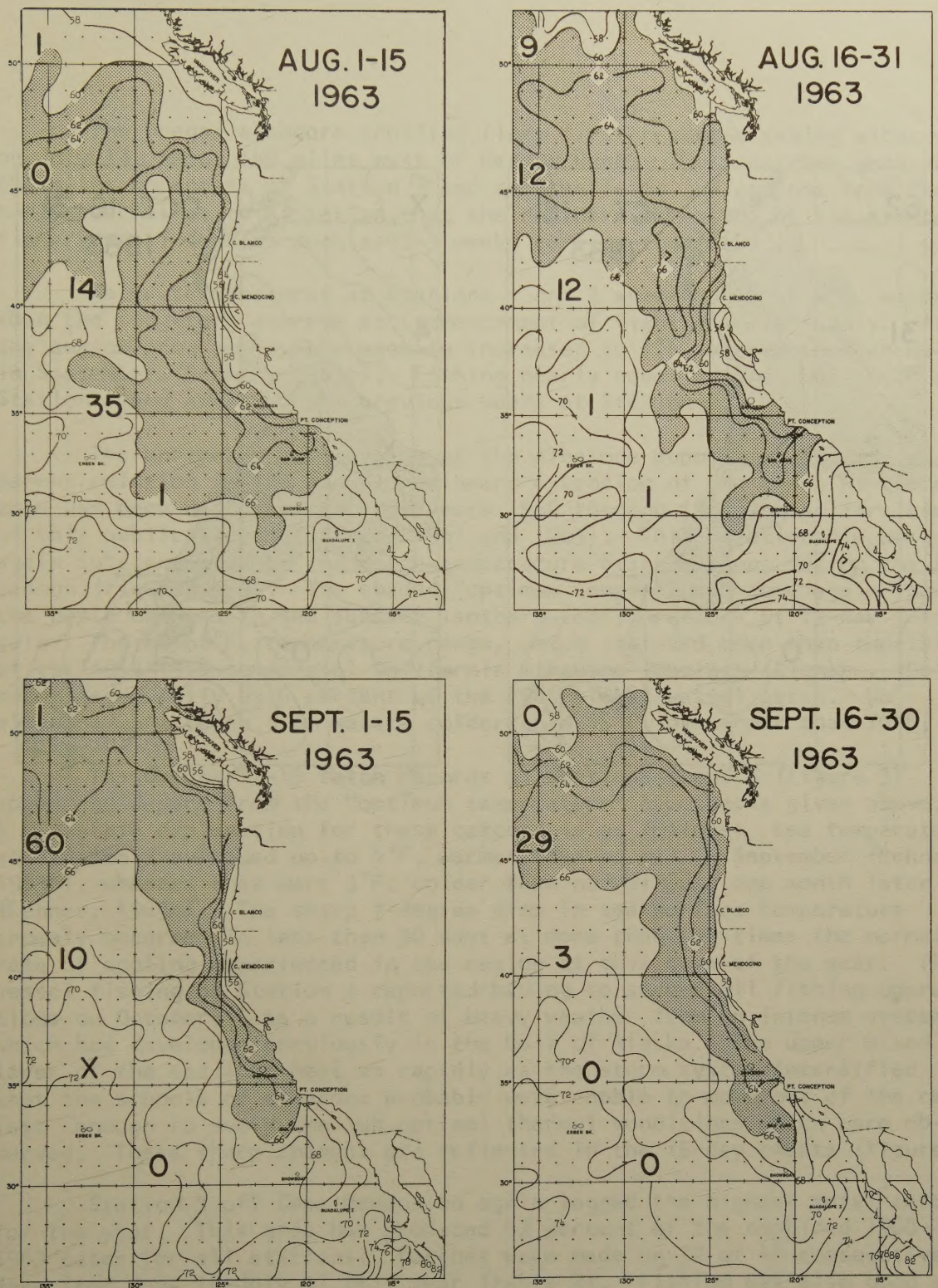

Figure 2.--Albacore catch by U.S. Navy radar picket vessels in August-September 1962. Large numerals represent the catch at each station; small numerals indicate water temperature; and "x" indicates no fishing during the period. Shaded area delimits the 60-66°F. temperature zone. More than two-thirds of the 1954-1958 California commercial albacore landings for June-September were taken from waters within these temperature limits.

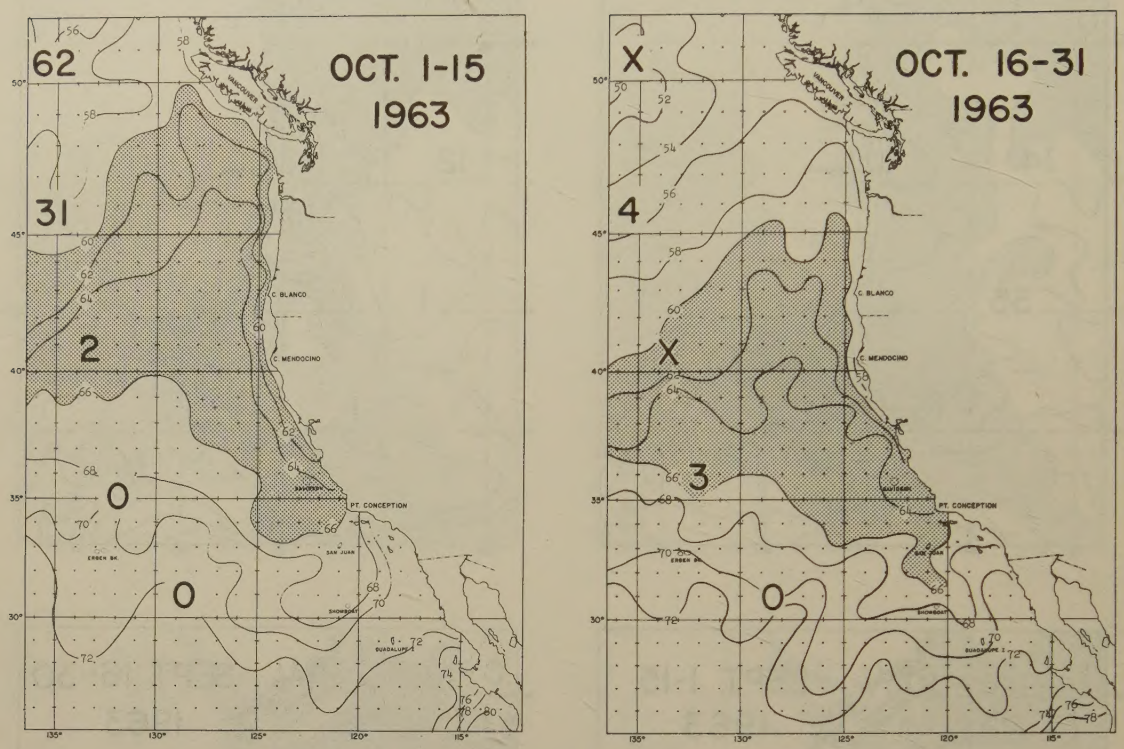

Figure 3.--Albacore catch by U.S. Navy radar picket vessels in October 1963. Large numerals represent the catch at each station; small numerals indicate water temperature; and "x" indicates no fishing during the period. Shaded area delimits the 60-66°F. temperature zone. More than two-thirds of the 1954-1958 California commercial albacore landings for June-September were taken from waters within these temperature limits.

The Oregon albacore trolling fleet first reported taking albacore on July 13, about 140 miles west of Heceta Head. These catches were about 200 miles northeast of Station 3 and substantiated indications from the early catches at this station that the northern extension of the albacore fishery was indeed as much as 2-3 weeks earlier than usual.

Water temperatures at Stations 1 and 2 averaged about 2°F. warmer than the long-term average at commencement of fishing in late July. As the season progressed, the anomaly increased to 4°F. warmer than normal in September (Renner, 1963b). Fishing nearly equalled the 1962 catch at Station 1 and exceeded all previous years at Station 2.

The northward progression of the albacore population and its apparent relation to the annual northward extension of the 60-66°F. thermal zone has been discussed for the years 1960 through 1963 in earlier issues of this publication (Flittner, 1961 and 1963). This relationship was again substantiated by the catch-temperature distributions during the 1963 season (figures 1-3). The shaded "optimum temperature" zone again shows the rapid changes in sea surface isotherm configurations at 15-day intervals. The 60-66°F. temperature range, which included more than two-thirds of the 1954-1958 commercial California albacore landings (Clemens, 1961), encompassed fully 84.5 percent of the 1963 picket vessel catch. No albacore were taken from waters colder than 55°F. or warmer than 70°F.

The October 1-15 catch records at Stations 1 and 3 (figure 3) appear to depart from the "optimum temperature" hypothesis given above. A plausible explanation for these catches is as follows: sea temperatures at Station 1 averaged up to 4°F. warmer than normal in September (Renner, 1963b), whereas they were 3°F. colder than normal just one month later (Renner, 1963c). The sharp 7-degree drop in sea surface temperature anomaly occurred in less than 30 days at more than two times the normal rate of cooling experienced in the region at this time of the year. The vessel fishing on Station 1 reported having to secure all fishing operations on October 15 as a result of heavy weather from an intense system which had developed previously in the Gulf of Alaska. The upper mixed layer of the sea lost heat so rapidly as the storm system intensified that the schools of albacore probably were unable to move out of the region fast enough to avoid the sub-optimal thermal conditions which were observed. These sharp changes are reflected in the 15-day charts (figure 3).

Station 3 off Cape Mendocino again logged the highest total catch for the year. This area has produced 47 percent of the combined 1960-1963 catch for all stations. Catches were made on 32 of 46 consecutive days from June 16-July 31 this year (table 2). Fishing was also good at Station 2 where catches were logged on 35 of 45 consecutive days between September 1 and October 15, thus establishing a new record for this area. Fishing was poorest at Station 5, where only 5 albacore were taken on 5 separate days during the entire season.

Table 2.--Albacore catch and effort data for U.S. Navy radar picket vessels trolling on station, June-October, 1963.

Station and item	Period										Totals
	June		July		August		September		October		
	1-15	16-30	1-15	16-31	1-15	16-31	1-15	16-30	1-15	16-31	
1											
Number of fish	1/ 0	1/ 0	0	1	1	9	1	1/ 0	62	2/ x	74
Number of days fish were taken	0	0	0	1	1	2	1	0	12	x	17
Line-hours fished	18	32	448	512	737	861	168	108	589	x	3,473
Catch per 100 line-hours	0.0	0.0	0.0	0.2	0.1	1.0	0.6	0.0	10.5	x	2.1
2											
Number of fish	1/ 0	0	0	3	1/ 0	12	60	29	31	4	139
Number of days fish were taken	0	0	0	2	0	6	14	9	12	4	47
Line-hours fished	0.0	424	304	256	0	1,221	2,321	513	1,116	456	6,611
Catch per 100 line-hours	0	0.0	0.0	1.2	0.0	1.0	2.6	5.7	2.8	0.9	2.1
3											
Number of fish	0	20	135	226	1/ 14	1/ 12	10	3	1/ 2	2/ x	422
Number of days fish were taken	0	7	10	15	3	3	3	1	2	x	44
Line-hours fished	368	714	814	787	44	114	860	944	184	x	4,829
Catch per 100 line-hours	0.0	2.8	16.6	28.7	31.8	10.5	1.2	0.3	1.1	x	8.7
4											
Number of fish	0	1/ 0	23	92	35	1/ 1	2/ x	1/ 0	0	3	154
Number of days fish were taken	0	0	6	14	11	1	x	0	0	1	37
Line-hours fished	930	192	424	1,054	910	437	x	84	2,696	1,273	8,000
Catch per 100 line-hours	0.0	0.0	5.4	8.7	3.8	0.2	x	0.0	0.0	0.2	1.9
5											
Number of fish	1/ 0	0	0	3	1	1	0	0	1/ 0	0	5
Number of days fish were taken	0	0	0	3	1	1	0	0	0	0	5
Line-hours fished	18	564	577	763	814	649	1,198	612	138	600	5,933
Catch per 100 line-hours	0.0	0.0	0.0	0.4	0.1	0.2	0.0	0.0	0.0	0.0	0.1
Totals											
Number of fish	0	20	158	325	51	35	71	32	95	7	794
Number of days fish were taken	0	7	16	35	16	13	18	10	26	5	150
Line-hours fished	1,334	1,926	2,567	3,372	2,505	3,282	4,547	2,261	4,723	1,729	28,846
Catch per 100 line-hours	0.0	1.0	6.2	9.6	2.0	1.1	1.6	1.4	2.0	0.4	2.8

1/ Station fished intermittently during period.
2/ Station not fished.

Total fishing effort expended by the picket vessel fleet for the period June 1-October 31 amounted to 28,846 line hours, or about 8 percent less than last year (table 2). Effort varied according to the individual vessels on station, weather, and operational commitments requiring temporary interruption of fishing. Consequently, although Station 3 was again the high producer for the season, total effort expended was less than that on Stations 4, 2, and 5, respectively (table 2). The seasonal average catch per 100 line hours at Station 3 was 8.7 fish, whereas in 1962 the average for the same station was 6.6 fish. In both years, the average catch per 100 line hours at Station 3 has exceeded the average combined catch of all stations by a factor of 3.

Although the peak of the commercial fishing activity occurred in September, the highest catches were recorded by Navy vessels during the July 16-31 interval (table 2). Catch per 100 line hours averaged 9.6 fish. Highest catch rates were attained at Station 3, where during the July 16-31 period, 28.7 albacore were landed per 100 line hours of trolling; in the August 1-15 interval 31.8 fish were taken per 100 line hours.[2/]

As in previous years, catch-effort data were tabulated for all stations up to October 31 in accordance with the original fishing time limit (April 1-October 31) set up at the inception of the trolling program in 1960. When the 1963 season appeared to persist much later than usual, the vessels occupying Stations 4 and 5 were asked to continue fishing. These vessels were able to fish well into December before heavy weather swept away their gear.

Evidence of late-season activity was noted last year at 40°N., 133°W. where 16 albacore from 7-11 pounds were taken from November 1 to 10. This year, 247 albacore were taken at Station 4 (36°N., 131°W.) between November 1 and December 17. Catches reached a peak in the November 1-15 interval and declined thereafter (table 3). The vessel on Station 4 reported losing an additional 40 albacore because of inclement weather and heavy seas between November 1 and 8. Station 5 produced no catch.

One noteworthy feature of the late-season catch is that for the second year, the picket vessels apparently observed the offshore migration of the albacore population. Heavy commercial landings of small fish were reported at Monterey and Morro Bay during the week ending October 25. Catches declined in the November 1-15 interval, and bad weather terminated the fishery in the week ending November 22.

[2/] Although the effort expended on the station was minimal during this time, fishing occurred at intervals throughout the entire 15-day period. Fish were taken on each day the lines were out.

Table 3.--Albacore catch and effort data for U.S. Navy radar picket vessels trolling on Station 4 during November and December, 1963.

Item	November		December		Totals
	1-15	16-30	1-15	16-31	
Number of fish	194	40	11	1/ 2	247
Number of days fish were taken	14	14	6	1	35
Line-hours fished	1,111	718	374	44	2,247
Catch per 100 line-hours	17.5	5.6	2.9	4.5	11.0

1/ Station not fished entire period due to loss of fishing gear.

The modal length of the November-December catch at Station 4 was 59 centimeters (23.2 inches, 9.5 pounds). No fish larger than 64 centimeters (25.2 inches, 12 pounds) were taken. Eight albacore were less than 40 centimeters long; the smallest, a 32 centimeter fish (12.6 inches, about 1-3/4 pounds), was caught November 22 in 68°F. water.

Comparison of albacore movements in 1963 to last year's generalized schematic model of migration (Flittner, 1963) demonstrated close agreement on the broad scale. Albacore entered the coastal region and turned north about 3 weeks earlier than in the preceding 3 years, whereas migration into southern waters was up to 6 weeks later than usual. Onshore and northward movements appeared to follow the model and were limited by the distribution of "optimum" sea temperatures. The development of a good nearshore fishery in Central California and Oregon waters came early in July (figure 1) and persisted through October as favorable sea temperatures developed into a narrow north-south zone well within reach of the albacore fishing fleet (figures 2-3).

U.S.S. Picket carried off the honors in total catch for the second consecutive year: 360 albacore were landed of a grand total of 1,041 fish for all vessels combined; of this total, 357 were taken on Station 5 in a single patrol (figure 4). U.S.S. Scanner was second highest vessel with a total catch of 284 albacore. Picket logged the highest catch in one day at Station 5 on July 19 when 52 albacore were taken; 46 had been caught on the previous day. Scanner landed 42 fish on November 12 at Station 7, and took 33 albacore two days later.

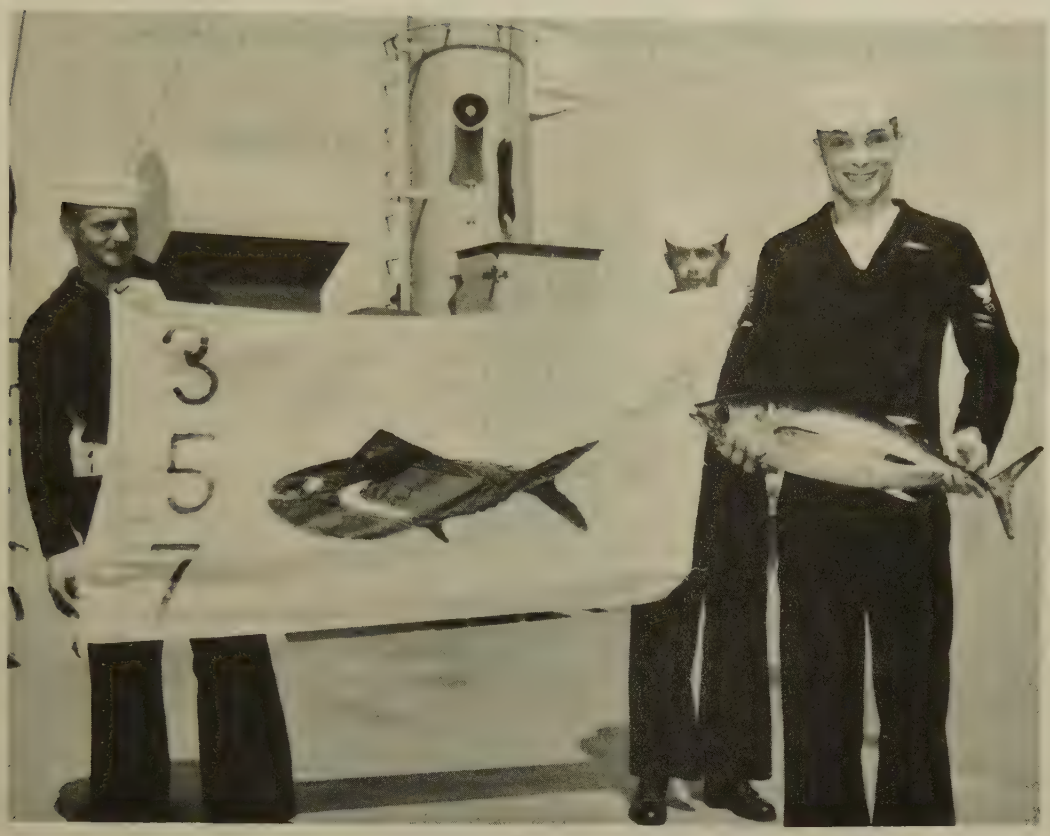

Figure 4.--Men of the U.S.S. Picket proudly display a sample of their record catch made on a single patrol at Station 5.

Age-group representation of the 1963 picket vessel catch was similar to last year. The 22-inch group (56 cm.) comprised 42 percent of the catch, whereas the 25 inch group (62-64 cm.) made up about 48 percent of the total (figure 5). The remainder of the catch consisted of very small fish (about 2 percent) and fish 30 inches or longer (about 8 percent). The largest fish taken was a 36-inch, 34-pound albacore which was caught on July 23 at Station 1.

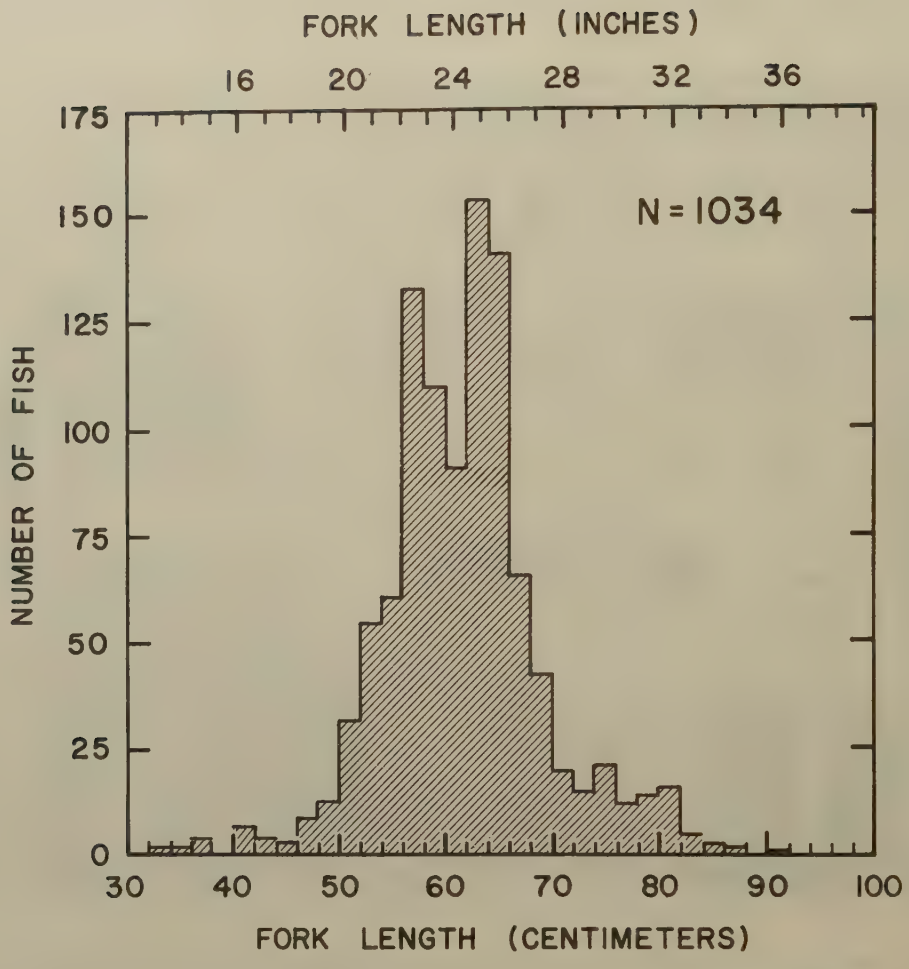

Figure 5.--Length-frequency distribution of albacore taken by U.S. Navy radar picket vessels trolling on station, June-December, 1963. All stations combined.

For the fourth consecutive year, distribution and availability of albacore off the U.S. west coast has exhibited a striking correlation with prevailing sea surface temperatures as revealed by our laboratory's 15-day charts. The rapid northward progression of the "optimum temperature" zone with the advance of each summer season offers substantial evidence concerning one of the factors causing the rapid seasonal shifting of the centers of albacore abundance.

Radar Picket Squadron One personnel are to be congratulated once again for their participation in a cooperative program which has proven its worth not only to the albacore fishing industry but also to the picket vessel crew members themselves. Tuna research workers and albacore fishermen alike are grateful to the officers and men of the squadron for their continued and enthusiastic participation in the trolling program.

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SEA SURFACE TEMPERATURE CHARTS, EASTERN PACIFIC OCEAN
FEBRUARY 1964

Acknowledgments

The following organizations and stations contributed data for the February 1964 charts:

U.S. Bureau of Commercial Fisheries Exploratory Fishing and Gear Research Base, Seattle, Washington
U.S. Bureau of Commercial Fisheries Biological Laboratories, La Jolla, California and Honolulu, Hawaii
U.S. Weather Bureau, San Diego, California
U.S. Naval Communication Station Balboa, Fort Amador, Canal Zone
U.S. Weather Bureau Port Meteorological Office, Cristobal, Canal Zone
Guadalupe Island, Coronado Island, Ensenada, Cedros Island and Almejas Bay by Pedro Mercado of the Universidad Autonoma de Baja California, Ensenada, Mexico
Hopkins Marine Station, Pacific Grove, California by J. P. Balesteri
Instituto de Nacional de Pesca, Guayaquil, Ecuador
Inter-American Geodetic Survey by Rene Cortes at Salina Cruz, Mexico; David Ortega at Manzanillo, Mexico; R. Pereira at Pt. Armuelles, Panama; V. E. Castillo at Tumaco, Colombia; N. Zambrano at San Cristobal, Galapagos; S. Valenzuela at La Libertad, Ecuador; G. Villar at Talara, Peru; Juan Andia at San Juan, Peru
Inter-American Tropical Tuna Commission, La Jolla and Terminal Island, California and Guayaquil, Ecuador
Kelco Company, San Diego, California
Lifeguard Headquarters, Newport Beach, California
Oregon State University, R/V Acona
Pacific Oceanographic Group, Nanaimo, British Columbia, by H. J. Hollister from observations by R. W. Collins at Quatsino Lightstation; J. L. Fraser at Cape St. James Light; B. Stuart at Amphitrite Point Light; R. A. Smith at Langara Island Light
Scripps Institution of Oceanography, La Jolla, California by Margaret Robinson and Hans Klein

Charts

Figure 1.--Mean sea surface temperatures (°F) derived from approximately 8000 observations. Squares show temperatures at weather-ship stations. Numerals on shore are temperatures at coastal and light-ship stations.

Figure 2.--Deviation of sea surface temperatures (°F) from long term charts of H.O. 225. Hatched areas are colder than mean.

Figure 3.--Deviation of sea surface temperatures (°F) from those of February 1963. Hatches areas are colder than 1963.

Figure 4.--Sea surface temperatures (°F) by 1-degree squares, approximately 2000 observations. Line under temperatures indicates average of two or more observations. Numerals on shore are temperatures at coastal stations.

Figure 5.--Deviation of sea surface temperatures (°F) February 1964-February 1963 by 1-degree squares. Shaded areas are colder than 1963.

Figure 6.--Deviation of sea surface temperatures (°F) from 12-year mean (1947-1958) by 2-degree squares. Shaded areas are colder than 1963.

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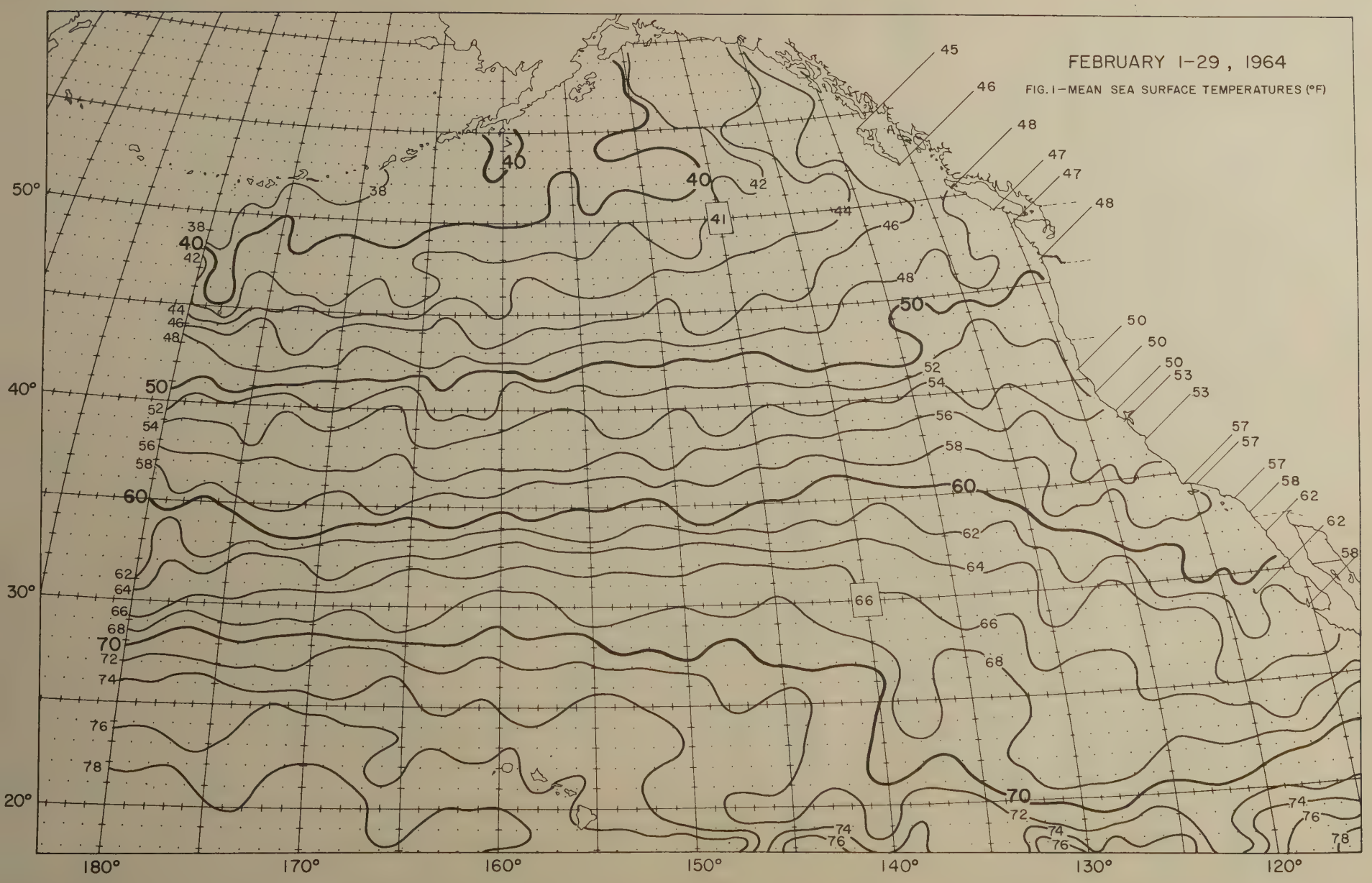
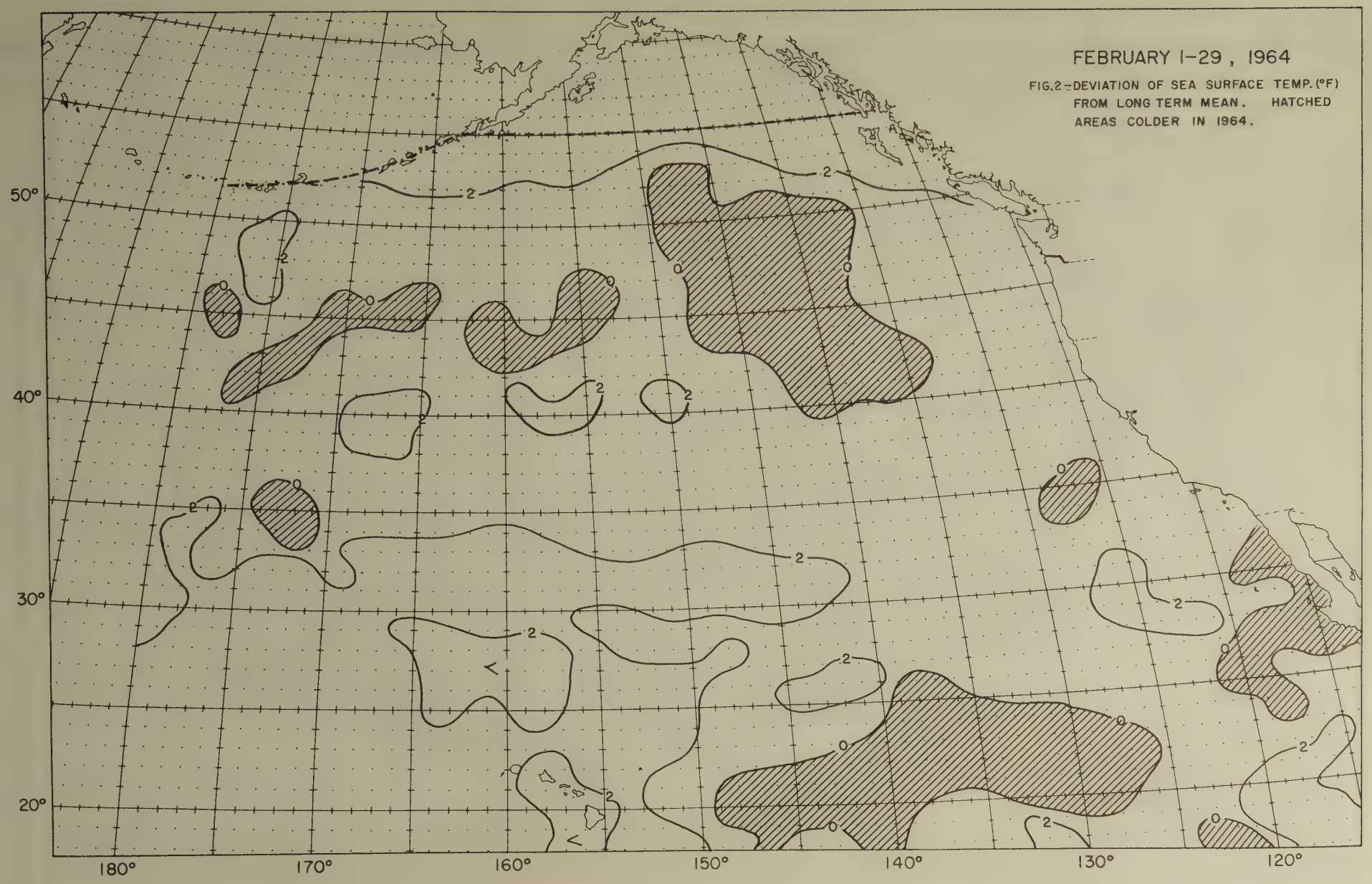
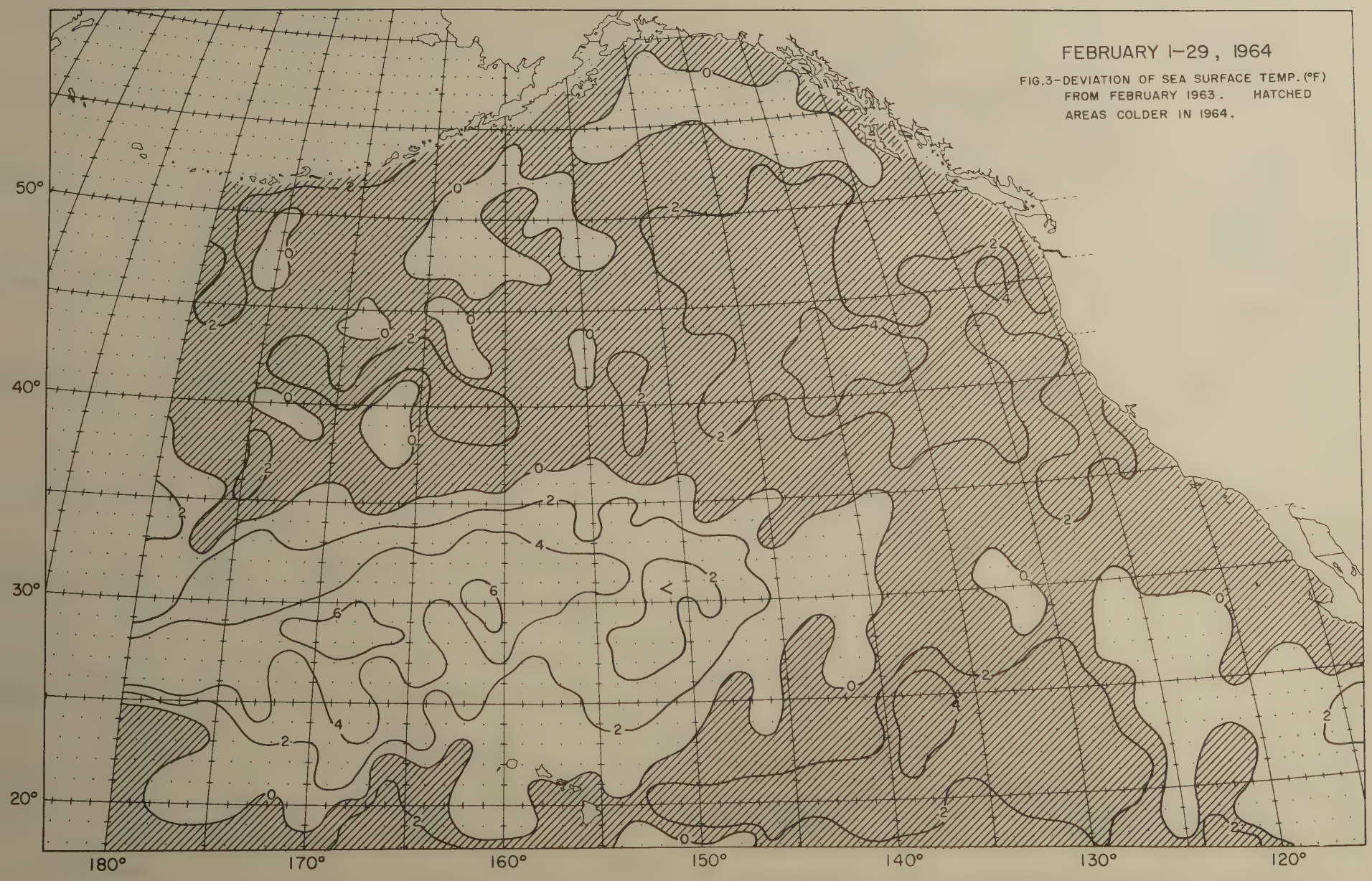
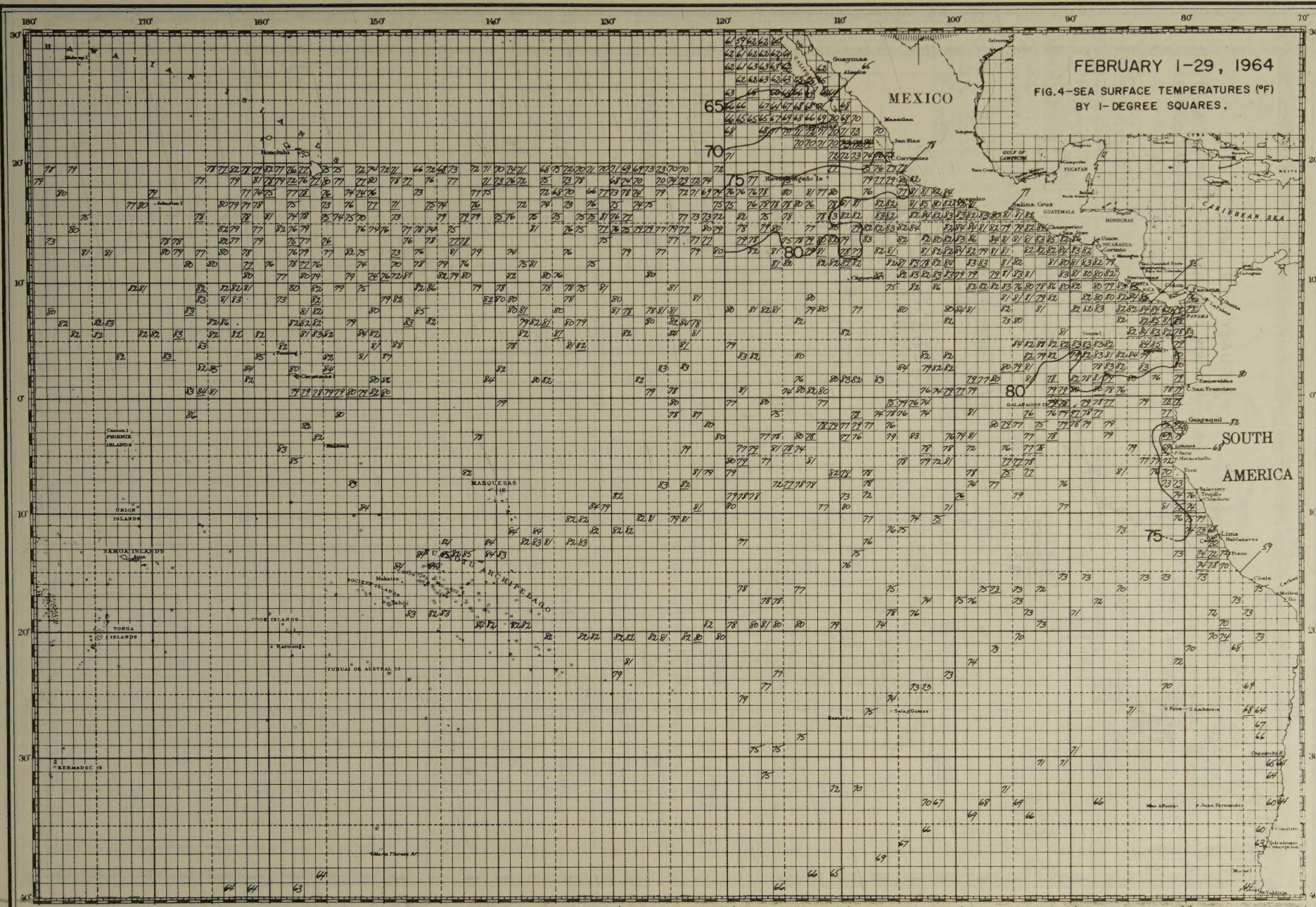
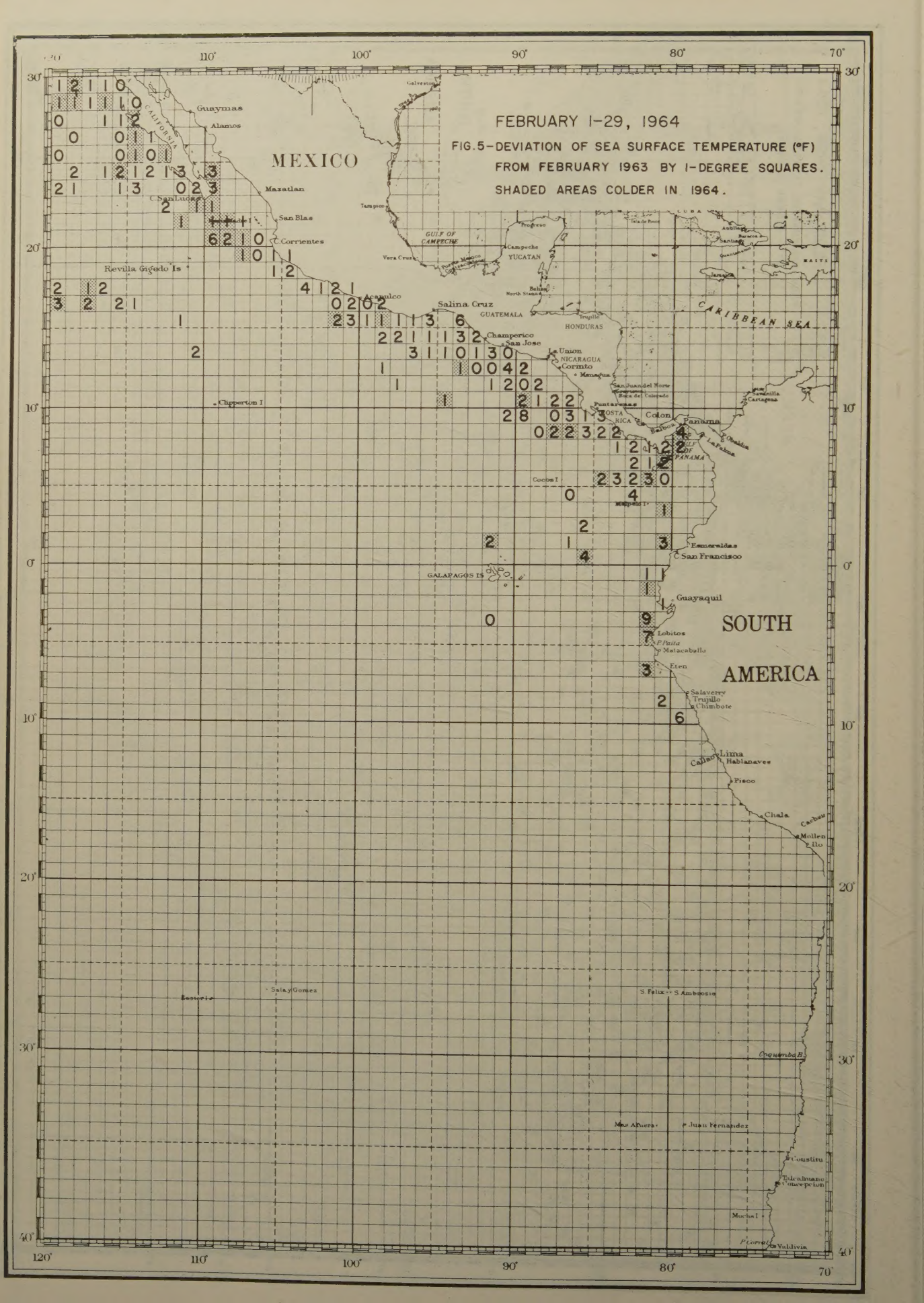
Fishery Biologist (General)


FEBRUARY 1-29, 1964
FIG. 1—MEAN SEA SURFACE TEMPERATURES (°F)
50°
40°
30°
20°
180°
170°
160°
150°
140°
130°
120°


FEBRUARY 1-29, 1964
FIG. 2 = DEVIATION OF SEA SURFACE TEMP. (°F) FROM LONG TERM MEAN. HATCHED AREAS COLDER IN 1964.
50°
40°
30°
20°
180°
170°
160°
150°
140°
130°
120°
0
2


FEBRUARY 1–29, 1964
FIG.3–DEVIATION OF SEA SURFACE TEMP. (°F) FROM FEBRUARY 1963. HATCHED AREAS COLDER IN 1964.
50°
40°
30°
20°
180°
170°
160°
150°
140°
130°
120°


FEBRUARY 1-29, 1964
FIG. 4-SEA SURFACE TEMPERATURES (°F)
BY 1-DEGREE SQUARES.
MEXICO
SOUTH
AMERICA
CARIBBEAN SEA
GUATEMALA
HONDURAS
NICARAGUA
PANAMA
YUCATAN
GULF OF CAMPECHE
Guaymas
Mazatlan
San Blas
Corrientes
Salina Cruz
Champerico
Corinto
Puntarenas
Coiba I.
Galapagos Is.
Guayaquil
Esmeraldas
San Francisco
Salaverry
Trujillo
Chimbote
Lima
Callao
Pisco
Chala
Mollendo
Ilo
Arica
Iquique
Antofagasta
Valparaiso
Juan Fernandez
Mas A Fuera
Mas A Tierra
San Felix
San Ambrosio
Salas y Gomez
Easter I.
Pitcairn I.
Henderson I.
Ducie I.
Oeno I.
Mangareva
Tuamotu Archipelago
Tahiti
Society Islands
Marquesas Is.
Cook Islands
Rarotonga
Tubuai or Austral Is.
Samoa Islands
Union Islands
Tonga Islands
Kermadec Is.
Phoenix Islands
Canton I.
Enderbury I.
Christmas I.
Fanning I.
Palmyra
Johnston I.
Honolulu
Hawaiian Islands
Revillagigedo Is.
Clipperton
Cocos I.
Malpelo I.
Tumaco
Buenaventura
Lobitos
Talara
Paita
Callao


FEBRUARY 1-29, 1964
FIG. 5-DEVIATION OF SEA SURFACE TEMPERATURE (°F)
FROM FEBRUARY 1963 BY 1-DEGREE SQUARES.
SHADED AREAS COLDER IN 1964.
MEXICO
SOUTH
AMERICA
CARIBBEAN SEA
GULF OF CAMPECHE
GULF OF PANAMA
GALAPAGOS IS
Guaymas
Alamos
Mazatlan
San Blas
C Corrientes
Revilla Gigedo Is
Acapulco
Salina Cruz
Champerico
San Jose
Corinto
Punta Arenas
Panama
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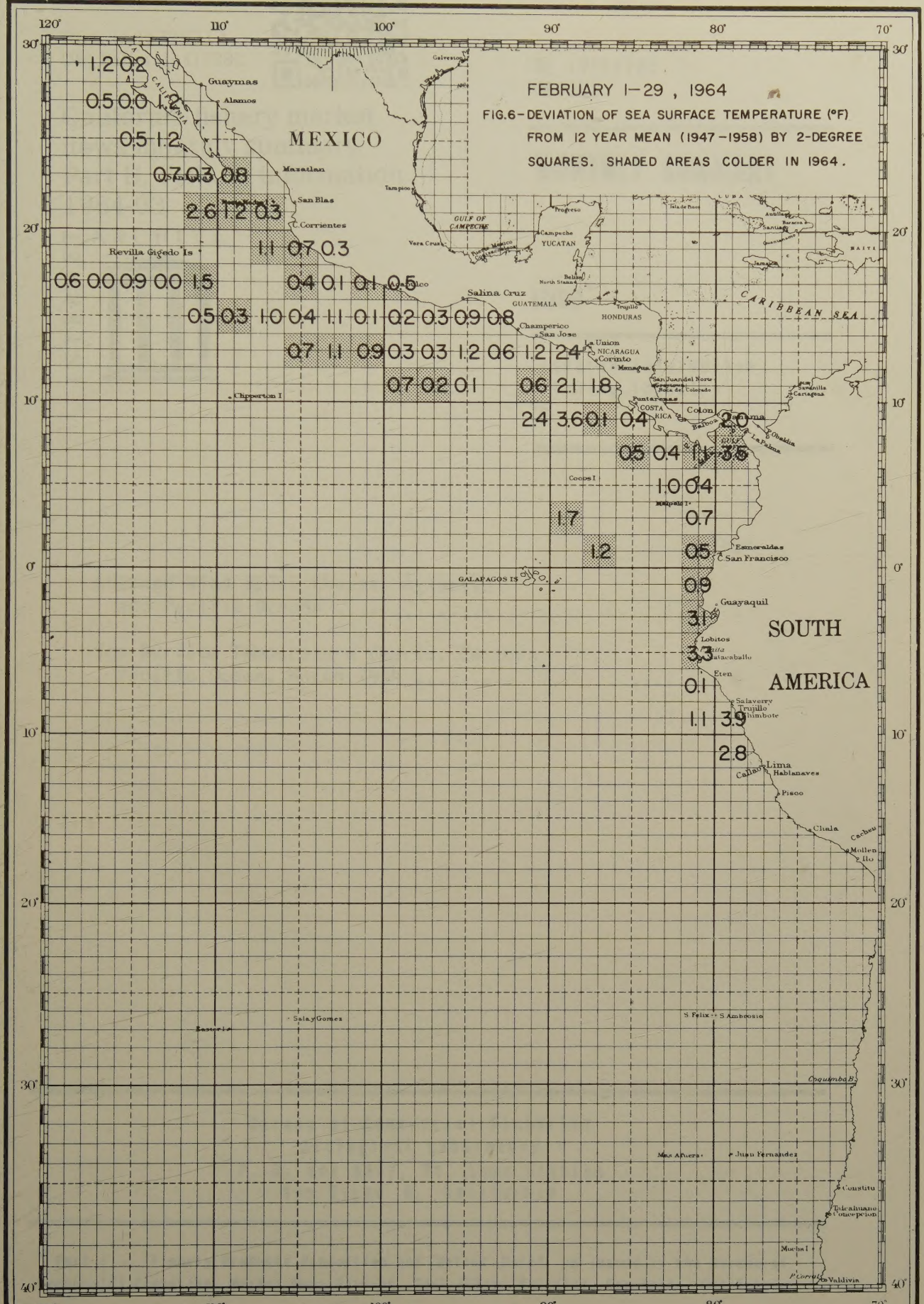
Guayaquil
Lobitos
Eten
Salaverry
Trujillo
Chimbote
Lima
Callao
Pisco
Chala
Salas y Gomez
S Felix
S Ambrosio
Juan Fernandez
Valdivia
120°
110°
100°
90°
80°
70°
30°
20°
10°
0°
40°


FEBRUARY 1–29 , 1964
FIG.6–DEVIATION OF SEA SURFACE TEMPERATURE (°F)
FROM 12 YEAR MEAN (1947–1958) BY 2-DEGREE
SQUARES. SHADED AREAS COLDER IN 1964.
MEXICO
SOUTH
AMERICA
CARIBBEAN SEA
GULF OF CAMPECHE
YUCATAN
GUATEMALA
HONDURAS
NICARAGUA
COSTA RICA
PANAMA
CUBA
HAITI
JAMAICA
GALAPAGOS IS
Guaymas
Alamos
Mazatlan
San Blas
Corrientes
Revilla Gigedo Is
Salina Cruz
Champerico
San Jose
La Union
Corinto
Managua
Chipperton I
Tampico
Vera Cruz
Progreso
Campeche
Belize
Trujillo
Colon
Esmeraldas
San Francisco
Guayaquil
Lobitos
Talara
Paita
Eten
Salaverry
Trujillo
Chimbote
Callao
Lima
Hablanaves
Pisco
Chala
Mollendo
Ilo
Arica
Sala y Gomez
S Felix
S Ambrosio
Juan Fernandez
Mas Afuera
Constitu
Talcahuano
Concepcion
Mocha I
Valdivia
Coquimbo
Cocos I
Malpelo I
1.2 0.2
0.5 0.0 1.2
0.5 1.2
0.7 0.3 0.8
2.6 1.2 0.3
1.1 0.7 0.3
0.6 0.0 0.9 0.0 1.5
0.4 0.1 0.1 0.5
0.5 0.3 1.0 0.4 1.1 0.1 0.2 0.3 0.9 0.8
0.7 1.1 0.9 0.3 0.3 1.2 0.6 1.2 2.4
0.7 0.2 0.1 0.6 2.1 1.8
2.4 3.6 0.1 0.4 2.0
0.5 0.4 1.1 3.5
1.0 0.4
1.7
0.7
1.2
0.5
0.9
3.1
3.3
0.1
1.1 3.9
2.8